3-9209

BESSER COMPANY
801 JOHNSON STREET, P.O. BOX 336, ALPENA, MICHIGAN 49707 U.S.A.
PHONE (517) 354-4111, TWX 510-440-1320, CABLE BESCO

PRESIDENT'S AWARD FOR EXCELLENCE IN EXPORT

29 October 1984

CONTRACT REPORT NO. OSQ84-00043

Mr. Harry S. Wilson
Mineral Sciences Laboratories, CA
405 Rochester Street
Ottawa, Ontario, CANADA K1A 0G1

TITLE:
EVALUATION OF SINTERED COLLIERY WASTE AS LIGHTWEIGHT CONCRETE MASONRY AGGREGATE

Dear Harry:

Enclosed is the data on forming and testing the sintered coal shale in block form. As you can see we attempted to stretch the sample as far as possible by running three different levels of sand blends and corresponding Portland Cement Levels. The incorporation of the expanded slag series was done to give you a further calibration of the aggregate performance.

As you study the compressive strength results you will note occasional lower levels of performance. One cannot tie it down as being consistently the right, center, or left block on the pallet for, as you will observe, it will vary. We feel that there are several factors that cause this problem. First, small batches minimizes preconsolidation in the large feed hopper before falling into the feedbox. Secondly, lighter density materials are more susceptible to the lack of preconsolidation and exhibit in consistency in the compressive strength test. Thirdly, on a commercial basis a producer would also learn by trial and error what level of vibration should be used with the lighter density units. If it is too severe the material will boil and not properly consolidate downward. Upon the return of the cutoff bar on the feedbox, too much material will be scrapped out thus causing a deficiency in the mold cavity. If the vibration is too light it will be necessary to extend the forming cycle time thus reducing the productivity. More time would have to be spent to determine the proper weights.

As I reviewed and assembled the data sheets, I noted that a shrinkage test was listed in the proposal. It was not performed and I apologize for the oversight on our part. I was pulled away from the Research and Training Department for a special assignment in International Sales at the time the testing was to be performed, thus causing the error. You of course will not be billed for that portion.

If you have any questions concerning the study please write or call.

Sincerely,

MAY 13 1985
MICROMEDIA

33pp

RESEARCH & TRAINING CENTER

Lucas E. Pfeiffenberger, Manager

LEP:jb
cc: J. Richardson
Enclosures

BLOCK FORMING DATA FOR

CANMET PROJECT

12 Sept. 84

Batch Proportions

With a difference in density batching was done by volume in order to minimize any variation. One cubic foot, a half cubic foot, and a third cubic foot measures were used.

The first letter designation indicated the established proportion of lightweight aggregate blended with the concrete sand. The remaining letters designated the lightweight aggregate in the mix.

LEGEND

A - (50% lightweight aggregate
(50% sand

B - (67% lightweight aggregate
(33% sand

C - (75% lightweight aggregate
(25% sand

S - expanded slag
P - pumice

SCW - sinter coal waste

Proportioning

Batches (Volume Proportions)	Aggregates - Cu. Ft. Lightweight	Sand	Portland Cement Type I - Cu. Ft. & Lb.	Plasticizer Diluted (10-1) Forrer's Mark V	C/a
A (9-1)	3	3	.66 & 62	56 ml.	0.1
B (8-1)	4	2	.74 & 72	64 ml.	0.2
C (6.7-1)	6	2	1.20 & 112	100 ml.	
(Limited amount of SCW dictated a smaller batch)					
C - SCW	5.33	1.75	1.06 & 99.5	89 ml.	0.29

A grab sample was taken from each batch after the two aggregates were mixed. Sieve analyses were determined on the blends. A second grab sample was taken upon discharge of the concrete from the mixer to determine moisture content. Two mixes were repeated and designated A2-S and B2-P because the first batch had too long compaction times during the forming and the latter batch needed to be repeated because it appeared to have excessive moisture.

Moisture Contents

Batch	As Sampled - g	Oven Dry - g	Percentage Moisture
A-S	1000	910	9.9
A2-S	800	733	9.1
B-S	800	726	10.2
C-S	800	720	11.1
A-P	800	715	11.9
B-P	800	684	17.0
B2-P	800	680	17.6
C-P	800	675	18.5
A-SCW	800	713	12.2
B-SCW	800	699	14.4
C-SCW	800	692	15.6

Block Forming On V3-12F Vibrapac

The small batches were dumped into a skip hoist and feed into a V3-12F Vibrapac. Forming times were recorded on a laboratory sheet recording feed time, finish (compaction) time, and delay time in seconds. The height of the cut-off bar was recorded. Each pallet was noted by dropping a metal tag in the core area of the right hand block. In that way the detailed history of the block could be compared for testing purposes. Designations of L, C, and R were used to denote left, center and right positions of the block on the steel pallet.

Curing

The block racks were put in a steam curing chamber. The air temperature rise and resultant cooling down period were recorded with a Bristol's Recorder.

BESSER RESEARCH & TRAINING CENTER

ALPENA, MICHIGAN

General Aggregate Test Data

CUSTOMER: Mineral Sciences Laboratories, CANMET DATE REC'D: 31 July '84

ADDRESS: 405 Rochester Street, Ottawa, Ontario, Canada K1A 0G1 DATE TESTED: 6 Sept.'84

SAMPLE SUBMITTED BY: Lucas E. Pfeiffenberger from Levi Slag Co., River Rouge, Michigan

SIEVE ANALYSIS ASTM C136

MATERIAL Expanded Slag				MATERIAL			
As Rec'd 282 G	Oven Dry 274 G	2.92% Total Moisture		As Rec'd G	Oven Dry G	% Total Moisture	
Sieve	Grams Retained	% Retained	Accum. % Retained	Sieve	Grams Retained	% Retained	Accum. % Retained
3/8				3/8			
4	54.0	19.7	19.7	4			
8	51.5	18.8	38.5	8			
16	41.5	15.1	53.6	16			
30	36.5	13.3	66.9	30			
50	30.0	10.9	77.8	50			
100	19.0	7.0	84.8	100			
Pan	41.5	15.2	--	Pan			
TOTAL	274.0	100.0	FM 3.41	TOTAL			FM

AGGREGATE UNIT WEIGHT Loose Pour - 63.45 lb./cu. ft. A.S.T.M. C 29

BULK SPECIFIC GRAVITY _____ A.S.T.M. C 128

APPARENT SPECIFIC GRAVITY _____ A.S.T.M. C 128

RESULTS OF ORGANICS IMPURITIES TEST A.S.T.M. DESIGNATION C 40

RESULTS OF % OF CLAY CONTENT TEST VIA QUART JAR TEST

METHOD: _____

TESTED BY: Don Clay

CHECKED BY: Robert Rohn

Form 800 R. & T. C.

Rev. 2-60

BESSER RESEARCH & TRAINING CENTER

ALPENA, MICHIGAN

General Aggregate Test Data

CUSTOMER: Mineral Sciences Laboratories, CANMET DATE REC'D: 3 December '83

ADDRESS: 405 Rochester Street, Ottawa, Ontario, Canada K1A 0G1 DATE TESTED: 6 September '84

SAMPLE SUBMITTED BY: Lucas E. Pfeiffenberger from The Central Oregon Pumice Co.

SIEVE ANALYSIS ASTM C136 Bend, Oregon

MATERIAL Pumice				MATERIAL			
As Rec'd 317 G	Oven Dry 313 G	1.3 % Total Moisture		As Rec'd G	Oven Dry G	% Total Moisture	
Sieve	Grams Retained	% Retained	Accum. % Retained	Sieve	Grams Retained	% Retained	Accum. % Retained
3/8	----	----	----	3/8			
4	58	18.5	18.5	4			
8	100	31.9	50.4	8			
16	92	29.4	79.8	16			
30	31	9.9	89.7	30			
50	6	1.9	91.6	50			
100	3	1.0	92.6	100			
Pan	23	7.3	--	Pan			
TOTAL	313	99.9	FM 4.23	TOTAL			FM

AGGREGATE UNIT WEIGHT Loose Pour - 29.09 lb./cu. ft. A.S.T.M. C 29

BULK SPECIFIC GRAVITY _____ A.S.T.M. C 128

APPARENT SPECIFIC GRAVITY _____ A.S.T.M. C 128

RESULTS OF ORGANICS IMPURITIES TEST A.S.T.M. DESIGNATION C 40

RESULTS OF % OF CLAY CONTENT TEST VIA QUART JAR TEST

METHOD: _____

TESTED BY: Don Clay

CHECKED BY: Robert Rohn

Form 800 R. & T. C.
Rev. 2-60

BESSER RESEARCH & TRAINING CENTER

ALPENA, MICHIGAN

General Aggregate Test Data

CUSTOMER: Mineral Science Laboratories, CANMET DATE REC'D: 31 July '84

ADDRESS: 405 Rochester Street, Ottawa, Ontario, Canada K1A OG1 DATE TESTED: 6 Sept. '84

SAMPLE SUBMITTED BY: Harry S. Wilson

SIEVE ANALYSIS ASTM C136

MATERIAL Sintered Coal Mine Shale				MATERIAL			
As Rec'd 224 G	Oven Dry 224 G	0 % Total Moisture		As Rec'd G	Oven Dry G	% Total Moisture	
Sieve	Grams Retained	% Retained	Accum. % Retained	Sieve	Grams Retained	% Retained	Accum. % Retained
3/8	1	0.4	0.4	3/8			
4	34	15.2	15.6	4			
8	35	15.6	31.2	8			
16	39	17.4	48.6	16			
30	37	16.5	65.1	30			
50	28	12.5	77.6	50			
100	20	8.9	86.5	100			
Pan	30	13.4	--	Pan			
TOTAL	224	99.9	FM 3.25	TOTAL			FM

AGGREGATE UNIT WEIGHT Loose Pour - 32.60 lb./cu. ft. A.S.T.M. C 29

BULK SPECIFIC GRAVITY _____ A.S.T.M. C 128

APPARENT SPECIFIC GRAVITY _____ A.S.T.M. C 128

RESULTS OF ORGANICS IMPURITIES TEST A.S.T.M. DESIGNATION C 40

RESULTS OF % OF CLAY CONTENT TEST VIA QUART JAR TEST

METHOD: _____

TESTED BY: Don Clay

CHECKED BY: Robert Rohn

Form 800 R. & T. C.

Rev. 2-60

BESSER RESEARCH & TRAINING CENTER

ALPENA, MICHIGAN

General Aggregate Test Data

CUSTOMER: Mineral Sciences Laboratories, CANMET **DATE REC'D:** 5 Sept. '84

ADDRESS: 405 Rochester Street, Ottawa, Ontario, K1A 0G1 Canada **DATE TESTED:** 6 Sept. '84

SAMPLE SUBMITTED BY: Lucas Pfeiffenberger from Straits Aggregate Corp. Millersburg, Michigan

SIEVE ANALYSIS ASTM C136

MATERIAL 2 NS Sand				MATERIAL			
As Rec'd G	Oven Dry G	% Total Moisture		As Rec'd G	Oven Dry G	% Total Moisture	
Sieve	Grams Retained	% Retained	Accum. % Retained	Sieve	Grams Retained	% Retained	Accum. % Retained
3/8	0	0	0	3/8			
4	0	0	0	4			
8	55	11.4	11.4	8			
16	90	18.7	30.1	16			
30	89	18.5	48.6	30			
50	162	33.6	82.2	50			
100	73	15.1	97.3	100			
Pan	13	2.7	--	Pan			
TOTAL	482	100.0	FM 2.70	TOTAL			FM

AGGREGATE UNIT WEIGHT Loose Pour - 98.2 lb./cu. ft. **A.S.T.M. C 29**

BULK SPECIFIC GRAVITY _____ **A.S.T.M. C 128**

APPARENT SPECIFIC GRAVITY _____ **A.S.T.M. C 128**

RESULTS OF ORGANICS IMPURITIES TEST A.S.T.M. DESIGNATION C 40

_____

_____

RESULTS OF % OF CLAY CONTENT TEST VIA QUART JAR TEST

METHOD: _____

_____

TESTED BY: D. Clay

CHECKED BY: R. Rohn

Form 800 R. & T. C.
Rev. 2-60

BESSER RESEARCH AND TRAINING CENTER

ALPENA, MICHIGAN

SIEVE ANALYSIS *

CUSTOMER: Mineral Science Laboratories, CANMET DATE REC'D: 12 Sept. '84

ADDRESS: 405 Rochester Street, Ottawa, Ontario, Canada KIA 0G1 DATE TESTED: 18 Sept. '84

SAMPLE Mixer Blends - Sampled before cement addition.

MATERIAL BATCH A-S (50% - 50%)

As Rec'd 416 G Oven Dry 385 G 8.05 % Total Moisture

Sieve	Grams Retained	% Retained	Accum. % Retained
3/8	-	-	-
4	41.5	10.78	10.78
8	65	16.88	27.66
16	72.5	18.83	46.49
30	63	16.36	62.85
50	90	23.38	86.23
100	43	11.17	97.40
Pan	10	2.60	-
TOTAL	385	100	FM 3.31

MATERIAL BATCH A2-S (50% - 50%)

As Rec'd 600 G Oven Dry 567 G 5.82 % Total Moisture

Sieve	Grams Retained	% Retained	Accum. % Retained
3/8	1	.18	.18
4	35	6.17	6.35
8	96	16.93	23.28
16	112	19.75	43.03
30	102	17.99	61.02
50	144	25.40	86.42
100	62	10.93	97.35
Pan	15	2.65	-
TOTAL	567	100	FM 3.18

MATERIAL BATCH B-S (67% - 33%)

As Rec'd 500 G Oven Dry 468 G 6.84 % Total Moisture

Sieve	Grams Retained	% Retained	Accum. % Retained
3/8	-	-	-
4	63.5	13.57	13.57
8	88	18.80	32.37
16	90	19.23	51.60
30	74	15.81	67.41
50	94.5	20.19	87.60
100	44	9.40	97.00
Pan	14	2.99	-
TOTAL	468	99.99	FM 3.50

MATERIAL BATCH C-S (75% - 25%)

As Rec'd 500 G Oven Dry 463 G 7.99 % Total Moisture

Sieve	Grams Retained	% Retained	Accum. % Retained
3/8	-	-	-
4	75	16.20	16.20
8	105	22.68	38.88
16	85	18.36	57.24
30	67	14.47	71.71
50	79	17.06	88.77
100	38	8.21	96.98
Pan	14	3.02	-
TOTAL	463	100	FM 3.70

* ASTM C136-46

Form 820 R. & T. C.
Rev. 6-65

TESTED BY: Mike Gentry

CHECKED BY: Don Clay

BESSER RESEARCH AND TRAINING CENTER

ALPENA, MICHIGAN

SIEVE ANALYSIS *

CUSTOMER: Mineral Science Laboratories, CANMET — DATE REC'D: 12 Sept. '84

ADDRESS: 405 Rochester Street, Ottawa, Ontario, Canada K1A 0G1 — DATE TESTED: 18 Sept. '84

SAMPLE: Mixer Blends - Sampled before cement addition.

MATERIAL: BATCH A-P (50% - 50%)

As Rec'd 500 G — Oven Dry 458 G — 9.17 % Total Moisture

Sieve	Grams Retained	% Retained	Accum. % Retained
3/8	0.5	.11	.11
4	38.5	8.41	8.52
8	85.0	18.56	27.08
16	86.0	18.78	45.86
30	76.5	16.70	62.56
50	103.0	22.49	85.05
100	55.0	12.01	97.06
Pan	13.5	2.95	---
TOTAL	458	100	FM 3.26

MATERIAL: BATCH B-P (67% - 33%)

As Rec'd 500 G — Oven Dry 431 G — 16.00 % Total Moisture

Sieve	Grams Retained	% Retained	Accum. % Retained
3/8	1	.23	.23
4	40	9.28	9.51
8	87	20.19	29.70
16	88	20.42	50.12
30	63	14.62	64.74
50	93	21.58	86.32
100	44	10.21	96.53
Pan	15	3.48	---
TOTAL	431	100	FM 3.37

MATERIAL: Batch B2-P (67%-33%)

As Rec'd 600 G — Oven Dry 498 G — 20.48 % Total Moisture

Sieve	Grams Retained	% Retained	Accum. % Retained
3/8	0.5	.10	.1
4	43.5	8.73	8.83
8	100	20.08	28.91
16	107	21.49	50.40
30	76	15.26	65.66
50	104	20.88	86.54
100	47	9.44	95.98
Pan	20	4.02	---
TOTAL	498	100	FM 3.36

MATERIAL: Batch C-P (75%-25%)

As Rec'd 700 G — Oven Dry 651 G — 7.53 % Total Moisture

Sieve	Grams Retained	% Retained	Accum. % Retained
3/8	1	.15	.15
4	57	8.76	8.91
8	143	21.97	30.88
16	143	21.97	52.85
30	95.5	14.67	67.52
50	128	19.66	87.18
100	55.5	8.53	95.71
Pan	28	4.30	---
TOTAL	651	100	FM 3.43

* ASTM C136-46

Form 820 R. & T. C.
Rev. 6-65

TESTED BY: Mike Gentry

CHECKED BY: Don Clay

BESSER RESEARCH AND TRAINING CENTER

ALPENA, MICHIGAN

SIEVE ANALYSIS *

CUSTOMER: Mineral Science Laboratories, CANMET DATE REC'D: 12 Sept. '84

ADDRESS: 405 Rochester Street, Ottawa, Ontario, Canada K1A 0G1 DATE TESTED: 18 Sept. '84

SAMPLE Mixer Blends - Sampled before cement addition.

MATERIAL Batch A-SCW (50%-50%)

As Rec'd 600 G Oven Dry 584 G 2.73 % Total Moisture

Sieve	Grams Retained	% Retained	Accum. % Retained
3/8	-0-	-0-	-0-
4	37	6.34	6.34
8	70	11.99	18.33
16	115	19.69	38.02
30	107	18.32	56.34
50	143	24.49	80.83
100	84	14.38	95.21
Pan	28	4.79	—
TOTAL	584	100	FM 2.95

MATERIAL Batch B-SCW (67%-33%)

As Rec'd 600 G Oven Dry 590 G 1.69 % Total Moisture

Sieve	Grams Retained	% Retained	Accum. % Retained
3/8	-0-	-0-	-0-
4	72	12.20	12.20
8	91	15.42	27.62
16	116	19.66	47.28
30	95	16.10	63.38
50	117	19.83	83.21
100	69	11.69	94.9
Pan	30	5.08	—
TOTAL	590	99.98	FM 3.29

MATERIAL Batch C-SCW (75% - 25%)

As Rec'd 600 G Oven Dry 592 G 1.35 % Total Moisture

Sieve	Grams Retained	% Retained	Accum. % Retained
3/8	-0-	-0-	-0-
4	57	9.63	9.63
8	92	15.54	25.17
16	127	21.45	46.62
30	100	16.89	63.51
50	113	19.09	82.60
100	65	10.98	93.58
Pan	38	6.42	—
TOTAL	592	100	FM 3.21

MATERIAL

As Rec'd G Oven Dry G % Total Moisture

Sieve	Grams Retained	% Retained	Accum. % Retained
3/8			
4			
8			
16			
30			
50			
100			
Pan			
TOTAL			FM

* ASTH C136-46

Form 820 R. & T. C.
Rev. 6-65

TESTED BY: Mike Gentry

CHECKED BY: Don Clay

CANMET PROJECT

DESSER RESEARCH & TRAINING CENTER
ALPENA, MICHIGAN

Date 12 Sept. '84

BATCH # A-S

PALLET #	FEED TIME	FINISH TIME	DELAY TIME	*CUT-OFF BAR (3 washers under)	MACH. CYCLE
A-1	1.5	2.5	0.25	1/2"	
A-2		2.2		1/4"	
A-3		1.5			
		B-S			
A-4		1.2		1/4"	
A-5		1.6		3/8"	
A-6		1.4			
A-7		1.4			
		C-S			
A-8		1.8		5/8"	
A-9		1.9			
A-10		1.7			
A-11		1.5			
A-12		1.9		7/8"	
		A-P			
A-13		1.8		3/8"	
A-14		1.6			
A-15		1.2			
A-16		2.2			
		B-P			Appeared too wet.
A-17		1.4		3/8"	
A-18		1.8		1"	
A-19		2.3			
A-20		1.7			
		C-P			
A-21		2.0		7/8"	
A-22		1.8			
A-23		2.2			
A-24		1.6			
A-25		1.4			
		A-SCW			
A-26		1.6		3/8"	
A-27		1.3			
A-28		1.9			
A-29		1.0			
		B-SCW			
D-1		1.3		3/8"	
D-2		1.5		1/2"	
D-3		2.2		5/8"	
D-4		1.2			

* Washers under cut-off bar should be noted before recording automatic feed heights.

Form 859 R.T.C.

CANMET PROJECT

BESSER RESEARCH & TRAINING CENTER
ALPENA, MICHIGAN

Date 12 Sept. '84

BATCH # C - SCW

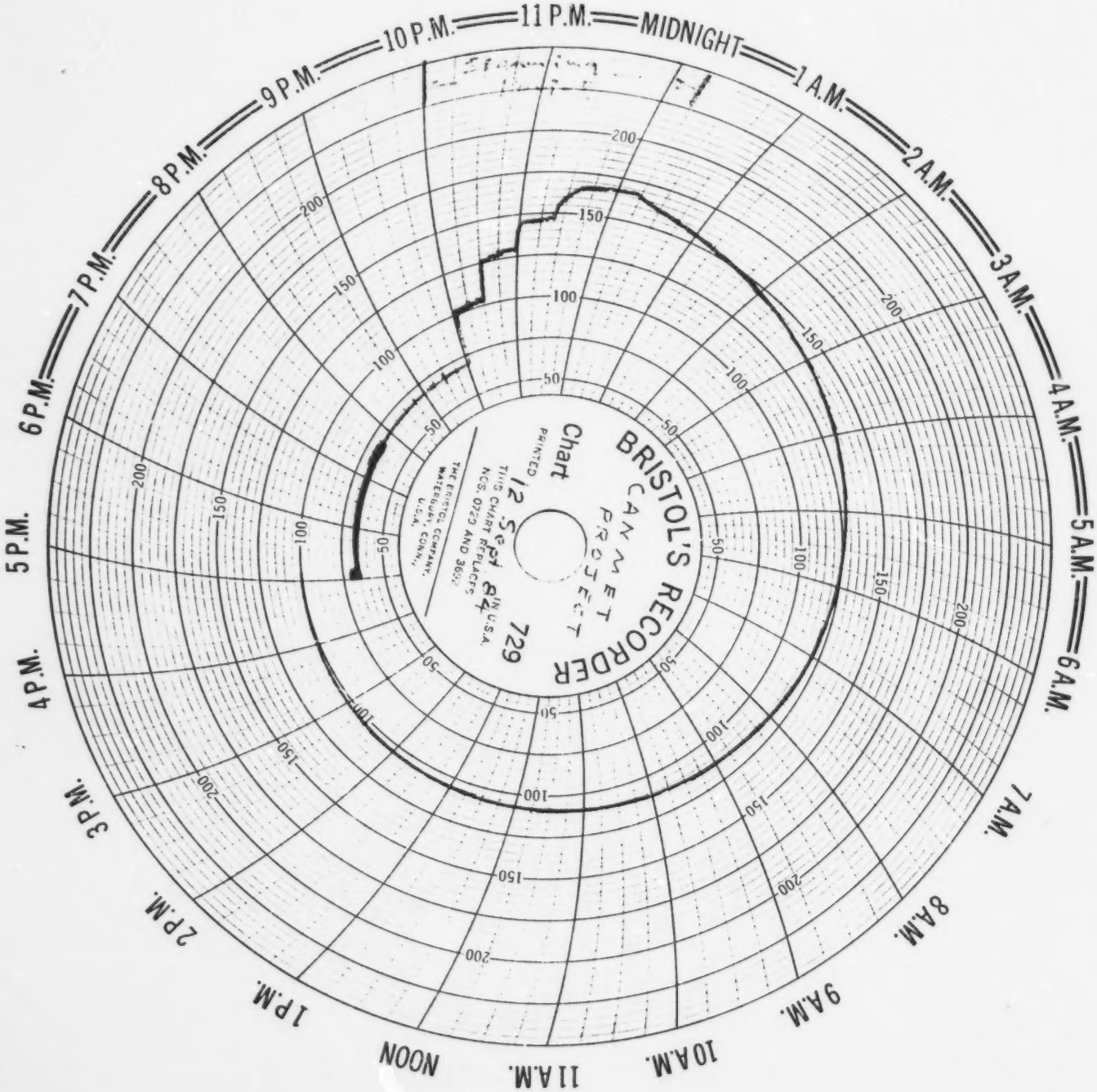
PALLET #	FEED TIME	FINISH TIME	DELAY TIME	*CUT-OFF BAR	MACH. CYCLE
D-5	1.5	1.4	0.25	7/8"	
D-6		2.1		1"	
D-7		1.8			
D-8		2.0			
		B2-P			
D-9		1.5		5/8"	
D-10		1.3		3/4"	
D-11		1.6		1"	
D-12		1.1			
		A2-S			
D-13		2.0		1/4"	
D-14		1.6			
D-15		1.2			

by. L. E. Pfeiffenberger and Geraldine Schellig

* Washers under cut-off bar should be noted before recording automatic feed heights.

Form 850-D T 6

Curing Cycle For Lightweight Block



BESSER RESEARCH & TRAINING CENTER

ALPENA, MICHIGAN

Block Test Data - Laboratory

CUSTOMER: Mineral Sciences Laboratories CANMET

ADDRESS: 405 Rochester Street, Ottawa, Ontario, Canada K1A 0G1

SAMPLE SUBMITTED BY: L. E. Pfeiffenberger

DATE MFG.: 12 Sept. '84

DATE REC'D: 14 Sept. '84

DATE TESTED: 19 Sept. '84
26 Sept. '84
10 Oct. '84

Batch A-S & A2-S	BLOCK DESCRIPTION					
Type of Material	50% Expanded Slag & 50% Sand					
Type Unit — Nominal Size	—	—	8" X 8" X 16"	—	—	
Number Cores	—	—	2	—	—	
Type Curing	Atmospheric + Pressure Steam Cured					
Minimum Thickness of Shell	—	—	1-1/4"	—	—	
Minimum Thickness of Tie — End	—	—	1"	—	—	
Center	—	—	1-1/8"	—	—	
COMPRESSION						
Length Inches	—	—	15.625	—	—	
Width Inches	—	—	7.625	—	—	
Area Square Inches	—	—	119.14	—	—	

7 Day Age — TEST MARK	A3-L		D-14C		D15-R	AVG. OF SERIES
Weight of Unit as Received * -lb.	34.23		34.35		33.67	34.08
Total Load Pounds	115,000		62,000		104,000	
P.S.I. Gross Area *	965		520		873	786

14 Day Age — TEST MARK	A3-C		D14-R		D15-L	
Weight of Unit as Received * -lb.	34.06		33.63		33.71	33.80
Total Load Pounds	61,000		133,000		122,000	
P.S.I. Gross Area *	512		1116		1024	884

28 Day Age — TEST MARK	A3-R		D14-L		D15-C	
Weight of Unit as Received * -lb.	33.16		33.63		33.50	33.43
Total Load Pounds	132,500		143,000		138,500	
P.S.I. Gross Area *	1112		1200		1162	1158

REMARKS: A3-R Has cracked face shells on back end. (Both sides)

*A.S.T.M. C 140

Form 810 B.R. & T.C.

Rev. 1-65

Tested By: Mike Gentry

Checked By: Don Clay

BESSER RESEARCH & TRAINING CENTER

ALPENA, MICHIGAN

Block Test Data - Laboratory

CUSTOMER: Mineral Sciences Laboratories CANMET

ADDRESS: 405 Rochester Street, Ottawa, Ontario, Canada K1A 0G1

SAMPLE SUBMITTED BY: L. E. Pfeiffenberger

DATE MFG.: 12 Sept. '84

DATE REC'D: 14 Sept. '84

DATE TESTED: 19 Sept. '84
26 Sept. '84
10 Oct. '84

Batch B-S	BLOCK DESCRIPTION				
Type of Material	67%	Expanded	Slag and	33% Sand	
Type Unit — Nominal Size	—	—	8" X 8" X 16"	—	—
Number Cores	—	—	2	—	—
Type Curing	Atmospheric + Pressure			Steam Cured	
Minimum Thickness of Shell	—	—	1-1/4"	—	—
Minimum Thickness of Tie — End	—	—	1"	—	—
Center	—	—	1-1/8"	—	—
COMPRESSION					
Length Inches	—	—	15.625	—	—
Width Inches	—	—	7.625	—	—
Area Square Inches	—	—	119.14	—	—

7 Day Age — TEST MARK	A5-L		A6-C		A7-R	AVG. OF SERIES
Weight of Unit as Received * -lb.	34.15		33.52		33.37	33.68
Total Load Pounds	154,000		142,000		137,000	
P.S.I. Gross Area *	1293		1192		1150	1212

14 Day Age — TEST MARK	A5-C		A6-R		A7-L	
Weight of Unit as Received * -lb.	33.59		33.49		33.32	33.47
Total Load Pounds	154,000		125,500		154,000	
P.S.I. Gross Area *	1293		1053		1293	1213

28 Day Age — TEST MARK	A5-R		A6-L		A7-C	
Weight of Unit as Received * -lb.	33.08		33.19		32.88	33.05
Total Load Pounds	132,000		169,000		162,000	
P.S.I. Gross Area *	1108		1418		1360	1295

REMARKS:

*A.S.T.M. C 140

Form 810 B.R. & T.C.

Rev. 1-65

Tested By: Mike Gentry

Checked By: Don Clay

BESSER RESEARCH & TRAINING CENTER

ALPENA, MICHIGAN

Block Test Data - Laboratory

CUSTOMER: Mineral Sciences Laboratories CANMET — DATE MFG.: 12 Sept. '84

ADDRESS: 405 Rochester Street, Ottawa, Ontario, Canada K1A 0G1 — DATE REC'D: 14 Sept. '84

SAMPLE SUBMITTED BY: L. E. Pfeiffenberger — DATE TESTED: 19 Sept. '84

26 Sept. '84

10 Oct. '84

Batch C-S	BLOCK DESCRIPTION				
Type of Material	75%	Expanded	Slag and	25% Sand	
Type Unit — Nominal Size	—	8" X	8" X 16"	—	—
Type Unit — Number Cores	—	—	2	—	—
Type Curing	Atmospheric +		Pressure	Steam Cured	
Minimum Thickness of Shell	—	—	1-1/4"	—	—
Minimum Thickness of Tie — End	—	—	1"	—	—
Minimum Thickness of Tie — Center	—	—	1-1/8"	—	—
COMPRESSION					
Length Inches	—	—	15.625	—	—
Width Inches	—	—	7.625	—	—
Area Square Inches	—	—	119.14	—	—

7 Day Age — TEST MARK	A8-L		A10-C		A11-R	AVG. OF SERIES
Weight of Unit as Received * -lb.	34.17		34.02		33.57	33.92
Total Load Pounds	200,000		192,000		103,000	
P.S.I. Gross Area *	1679		1612		865	1385

14 Day Age — TEST MARK	A8-C		A10-R		A11-L	
Weight of Unit as Received * -lb.	34.16		33.87		33.18	33.74
Total Load Pounds	220,000		207,000		201,500	
P.S.I. Gross Area *	1847		1737		1691	1758

28 Day Age — TEST MARK	A8-R		A10-L		A11-C	
Weight of Unit as Received * -lb.	33.52		33.74		33.05	33.44
Total Load Pounds	203,000		203,000		164,000	
P.S.I. Gross Area *	1704		1931		1377	1671

REMARKS:

*A.S.T.M. C 140

Form 810 B.R. & T.C.

Tested By: Mike Gentry

Checked By: Don Clay

BESSER RESEARCH & TRAINING CENTER

ALPENA, MICHIGAN

Block Test Data - Laboratory

CUSTOMER: Mineral Sciences Laboratories CANMET

ADDRESS: 405 Rochester Street, Ottawa, Ontario, Canada K1A 0G1

SAMPLE SUBMITTED BY: L. E. Pfeiffenberger

DATE MFG.: 12 Sept. '84

DATE REC'D: 14 Sept. '84

DATE TESTED: 19 Sept. '84
26 Sept. '84
10 Oct. '84

Batch A - P	BLOCK DESCRIPTION					
Type of Material	50% Pumice and 50% Sand					
Type Unit — Nominal Size	—	—	8" X 8" X 16"	—	—	
Type Unit — Number Cores	—	—	2	—	—	
Type Curing	Atmospheric + Pressure Steam Cured					
Minimum Thickness of Shell	—	—	1-1/4"	—	—	
Minimum Thickness of Tie — End	—	—	1"	—	—	
Minimum Thickness of Tie — Center	—	—	1-1/8"	—	—	
COMPRESSION						
Length Inches	—	—	15.625	—	—	
Width Inches	—	—	7.625	—	—	
Area Square Inches	—	—	119.14	—	—	

7 Day Age — TEST MARK	A13-L		A14-C		A15-R	AVG. OF SERIES
Weight of Unit as Received * -lb.	28.22		28.11		28.28	28.20
Total Load Pounds	123,000		58,500		55,000	
P.S.I. Gross Area *	1032		491		462	662

14 Day Age — TEST MARK	A13-C		A14-R		A15-L	
Weight of Unit as Received * -lb.	28.42		27.92		27.91	28.08
Total Load Pounds	70,000		66,000		124,000	
P.S.I. Gross Area *	588		554		1041	728

28 Day Age — TEST MARK	A13-R		A14-L		A15-C	
Weight of Unit as Received * -lb.	27.28		27.33		27.51	27.37
Total Load Pounds	127,000		131,000		91,500	
P.S.I. Gross Area *	1066		1100		768	978

REMARKS:

*A.S.T.M. C 140

Form 810 B.R. & T.C.

Rev. 1-65

Tested By: Mike Gentry

Checked By: Don Clay

BESSER RESEARCH & TRAINING CENTER

ALPENA, MICHIGAN

Block Test Data - Laboratory

CUSTOMER: Mineral Sciences Laboratories CANMET

ADDRESS: 405 Rochester Street, Ottawa, Ontario, Canada K1A 0G1

SAMPLE SUBMITTED BY: L. E. Pfeiffenberger

DATE MFG.: 12 Sept. '84

DATE REC'D: 14 Sept. '84

DATE TESTED: 19 Sept. '84
26 Sept. '84
10 Oct. '84

Batch B2-P	BLOCK DESCRIPTION					
Type of Material	67% Pumice and 33% Sand					
Type Unit — Nominal Size	—	—	8" X 8" X 16"	—	—	
Type Unit — Number Cores	—	—	2	—	—	
Type Curing	Atmospheric + Pressure Steam Cured					
Minimum Thickness of Shell	—	—	1-1/4"	—	—	
Minimum Thickness of Tie — End	—	—	1"	—	—	
Minimum Thickness of Tie — Center	—	—	1-1/8"	—	—	
COMPRESSION						
Length Inches	—	—	15.625	—	—	
Width Inches	—	—	7.625	—	—	
Area Square Inches	—	—	119.14	—	—	

7 Day Age — TEST MARK	D9-L		D10-C		D11-R	AVG. OF SERIES
Weight of Unit as Received * -lb.	25.86		25.89		25.78	25.84
Total Load Pounds	119,000		94,000		62,000	
P.S.I. Gross Area *	999		789		520	769

14 Day Age — TEST MARK	D9-C		D10-C		D11-L	
Weight of Unit as Received * -lb.	25.58		25.50		24.84	25.31
Total Load Pounds	84,000		120,000		87,000	
P.S.I. Gross Area *	705		1007		730	814

28 Day Age — TEST MARK	D9-R		D10-L		D11-C	
Weight of Unit as Received * -lb.	24.61		24.40		25.21	24.74
Total Load Pounds	133,000		101,000		87,500	
P.S.I. Gross Area *	1116		848		734	899

REMARKS:

*A.S.T.M. C 140

Form 810 B.R. & T.C.

Rev. 1-65

Tested By: Mike Gentry

Checked By: Don Clay

BESSER RESEARCH & TRAINING CENTER

ALPENA, MICHIGAN

Block Test Data - Laboratory

CUSTOMER: Mineral Sciences Laboratories CANMET

ADDRESS: 405 Rochester Street, Ottawa, Ontario, Canada K1A 0G1

SAMPLE SUBMITTED BY: L. E. Pfeiffenberger

DATE MFG.: 12 Sept. '84

DATE REC'D: 14 Sept. '84

DATE TESTED: 19 Sept. '84
26 Sept. '84
10 Oct. '84

Batch B-P	BLOCK DESCRIPTION				
Type of Material	67% Pumice and 33% Sand				
Type Unit — Nominal Size	—	—	8" X 8" X 16"	—	—
Number Cores	—	—	2	—	—
Type Curing	Atmospheric Pressure Steam Cured				
Minimum Thickness of Shell	—	—	1-1/4"	—	—
Minimum Thickness of Tie — End	—	—	1"	—	—
Center	—	—	1-1/8"	—	—

COMPRESSION

Length Inches	—	—	15.625	—	—
Width Inches	—	—	7.625	—	—
Area Square Inches	—	—	119.14	—	—

7 Day Age — TEST MARK	A17-L		A18-C		A20-R	AVG. OF SERIES
Weight of Unit as Received * -lb.	26.56		26.74		26.63	26.64
Total Load Pounds	71,500		109,000		116,500	
P.S.I. Gross Area *	600		915		978	831

14 Day Age — TEST MARK	A17-C		A18-R		A20-L	
Weight of Unit as Received * -lb.	26.09		26.07		26.20	26.12
Total Load Pounds	117,000		138,500		91,500	
P.S.I. Gross Area *	982		1162		768	971

28 Day Age — TEST MARK	A17-R		A18-L		A20-C	
Weight of Unit as Received * -lb.	25.32		25.51		25.15	25.33
Total Load Pounds	110,000		146,000		85,000	
P.S.I. Gross Area *	923		1225		713	954

REMARKS:

*A.S.T.M. C 140

Form 810 B.R. & T.C.

Rev. 1-65

Tested By: Mike Gentry

Checked By: Don Clay

BESSER RESEARCH & TRAINING CENTER

ALPENA, MICHIGAN

Block Test Data - Laboratory

CUSTOMER: Mineral Sciences Laboratories CANMET

ADDRESS: 405 Rochester Street, Ottawa, Ontario, Canada K1A 0G1

SAMPLE SUBMITTED BY: L. E. Pfeiffenberger

DATE MFG.: 12 Sept. '84

DATE REC'D: 14 Sept. '84

DATE TESTED: 19 Sept. '84
26 Sept. '84
10 Oct. '84

Batch C-P	BLOCK DESCRIPTION					
Type of Material	75% Pumice and 25% Sand					
Type Unit — Nominal Size	—	—	8" X 8" X 16"	—	—	
Number Cores	—	—	2	—	—	
Type Curing	Atmospheric + Pressure Steam Cured					
Minimum Thickness of Shell	—	—	1-1/4"	—	—	
Minimum Thickness of Tie — End	—	—	1"	—	—	
Center	—	—	1-1/8"	—	—	
COMPRESSION						
Length Inches	—	—	15.625	—	—	
Width Inches	—	—	7.625	—	—	
Area Square Inches	—	—	119.14	—	—	

7 Day Age — TEST MARK	A22-L		A24-C		A25-R	AVG. OF SERIES
Weight of Unit as Received * -lb.	23.82		23.94		23.50	23.75
Total Load Pounds	61,500		56,000		89,500	
P.S.I. Gross Area *	516		470		751	579

14 Day Age — TEST MARK	A22-C		A24-R		A25-L	
Weight of Unit as Received * -lb.	23.45		23.24		22.94	23.21
Total Load Pounds	68,000		87,000		72,000	
P.S.I. Gross Area *	571		730		604	635

28 Day Age — TEST MARK	A22-R		A24-L		A25-C	
Weight of Unit as Received * -lb.	23.26		22.93		22.81	23.00
Total Load Pounds	72,000		98,000		100,000	
P.S.I. Gross Area *	604		823		839	755

REMARKS:

*A.S.T.M. C 140

Form 810 B.R. & T.C.

Rev. 1-65

Tested By: Mike Gentry

Checked By: Don Clay

BESSER RESEARCH & TRAINING CENTER

ALPENA, MICHIGAN

Block Test Data - Laboratory

CUSTOMER: Mineral Sciences Laboratories CANMET

ADDRESS: 405 Rochester Street, Ottawa, Ontario, Canada K1A 0G1

SAMPLE SUBMITTED BY: L. E. Pfeiffenberger

DATE MFG.: 12 Sept. '84

DATE REC'D: 14 Sept. '84

DATE TESTED: 19 Sept. '84

26 Sept. '84

10 Oct. '84

Batch A-SCW	BLOCK DESCRIPTION					
Type of Material	50% Sintered Coal Waste & 50% Sand					
Type Unit — Nominal Size	—	—	8" X 8" X 16"	—	—	
Number Cores	—	—	2	—	—	
Type Curing	Atmospheric Pressure Steam Cured					
Minimum Thickness of Shell	—	—	1-1/4"	—	—	
Minimum Thickness of Tie — End	—	—	1"	—	—	
Center	—	—	1-1/8"	—	—	
COMPRESSION						
Length Inches	—	—	15.625	—	—	
Width Inches	—	—	7.625	—	—	
Area Square Inches	—	—	119.14	—	—	

7 Day Age — TEST MARK	A26-L		A27-C		A28-R	AVG. OF SERIES
Weight of Unit as Received * -lb.	27.66		27.76		27.96	27.79
Total Load Pounds	63,000		77,500		109,000	
P.S.I. Gross Area *	529		650		915	698

14 Day Age — TEST MARK	A26-C		A27-R		A28-L	
Weight of Unit as Received * -lb.	27.31		27.23		27.66	27.40
Total Load Pounds	71,000		113,000		97,500	
P.S.I. Gross Area *	596		948		818	787

28 Day Age — TEST MARK	A26-R		A27-L		A28-C	
Weight of Unit as Received * -lb.	27.01		26.70		27.30	27.00
Total Load Pounds	126,000		78,000		114,000	
P.S.I. Gross Area *	1058		655		957	890

REMARKS: A28-L Has cracked face shell (back top)

*A.S.T.M. C 140

Form 810 B.R. & T.C.

Rev. 1-65

Tested By: Mike Gentry

Checked By: Don Clay

BESSER RESEARCH & TRAINING CENTER

ALPENA, MICHIGAN

Block Test Data - Laboratory

CUSTOMER: Mineral Sciences Laboratories CANMET

ADDRESS: 405 Rochester Street, Ottawa, Ontario, Canada K1A 0G1

SAMPLE SUBMITTED BY: L. E. Pfeiffenberger

DATE MFG.: 12 Sept. '84

DATE REC'D: 14 Sept. '84

DATE TESTED: 19 Sept. '84
26 Sept. '84
10 Oct. '84

Batch B-SCW	BLOCK DESCRIPTION					
Type of Material	67% Sintered Coal Waste & 33% Sand					
Type Unit — Nominal Size	—	—	8" X 8" X 16"	—	—	
Type Unit — Number Cores	—	—	2	—	—	
Type Curing	Atmospheric Pressure Steam Cured					
Minimum Thickness of Shell	—	—	1-1/4"	—	—	
Minimum Thickness of Tie — End	—	—	1"	—	—	
Minimum Thickness of Tie — Center	—	—	1-1/8"	—	—	
COMPRESSION						
Length Inches	—	—	15.625	—	—	
Width Inches	—	—	7.625	—	—	
Area Square Inches	—	—	119.14	—	—	
7 Day Age — TEST MARK	D1-L		D2-C		D4-R	AVG. OF SERIES
Weight of Unit as Received * -lb.	25.36		25.71		24.60	25.22
Total Load Pounds	67,000		101,000		101,000	
P.S.I. Gross Area *	562		848		848	753
14 Day Age — TEST MARK	D1-C		D2-R		D4-L	
Weight of Unit as Received * -lb.	25.34		24.92		24.59	24.95
Total Load Pounds	129,500		113,000		121,500	
P.S.I. Gross Area *	1087		948		1020	1018
28 Day Age — TEST MARK	D1-R		D2-L		D4-C	
Weight of Unit as Received * -lb.	24.65		24.63		24.34	24.54
Total Load Pounds	84,000		147,000		126,000	
P.S.I. Gross Area *	705		1234		1058	999

REMARKS:

*A.S.T.M. C 140

Form 810 B.R. & T.C.

Rev. 1-65

Tested By: Mike Gentry

Checked By: Don Clay

BESSER RESEARCH & TRAINING CENTER

ALPENA, MICHIGAN

Block Test Data - Laboratory

CUSTOMER: Mineral Sciences Laboratories CANMET

ADDRESS: 405 Rochester Street, Ottawa, Ontario, Canada K1A 0G1

SAMPLE SUBMITTED BY: L. E. Pfeiffenberger

DATE MFG.: 12 Sept. '84

DATE REC'D: 14 Sept. '84

DATE TESTED: 19 Sept. '84
26 Sept. '84
10 Oct. '84

Batch C-SCW	BLOCK DESCRIPTION				
Type of Material	75% Sintered Coal Waste & 25% Sand				
Type Unit — Nominal Size	—	8" X	8" X 16"	—	—
Number Cores	—	—	2	—	—
Type Curing	Atmospheric + Pressure Steam Cured				
Minimum Thickness of Shell	—	—	1-1/4"	—	—
Minimum Thickness of Tie — End	—	—	1"	—	—
Center	—	—	1-1/8"	—	—

COMPRESSION

Length Inches	—	—	15.625	—	—
Width Inches	—	—	7.625	—	—
Area Square Inches	—	—	119.14	—	—

7 Day Age — TEST MARK	D5-L		D7-C		D8-R	AVG. OF SERIES
Weight of Unit as Received * -lb.	24.33		25.00		24.63	24.65
Total Load Pounds	136,000		136,000		135,000	
P.S.I. Gross Area *	1141		1141		1133	1138

14 Day Age — TEST MARK	D5-C		D7-R		D8-L	
Weight of Unit as Received * -lb.	24.38		24.42		23.87	24.22
Total Load Pounds	142,000		147,000		55,000	
P.S.I. Gross Area *	1192		1234		462	963

28 Day Age — TEST MARK	D5-R		D7-L		D8-C	
Weight of Unit as Received * -lb.	23.88		23.93		23.95	23.92
Total Load Pounds	151,000		139,000		150,000	
P.S.I. Gross Area *	1267		1167		1259	1231

REMARKS:

*A.S.T.M. C 140

Form 810 B.R. & T.C.

Rev. 1-65

Tested By: Mike Gentry

Checked By: Don Clay

BESSER RESEARCH & TRAINING CENTER

ALPENA, MICHIGAN

Block Test Data - Laboratory

CUSTOMER: Mineral Sciences Laboratories CANMET — DATE MFG.: 12 Sept. '84

ADDRESS: 405 Rochester Street, Ottawa, Ontario, Canada K1A 0G1 — DATE REC'D: 14 Sept. '84

SAMPLE SUBMITTED BY: L. E. Pfeiffenberger — DATE TESTED: 10 Oct. '84

Batch A2S	BLOCK DESCRIPTION					
TEST MARK	D13-L		D13-C		D13-R	
Type of Material	50%	Expanded	Slag and	50% Sand		
Type Unit — Nominal Size		8"	X 8" X 16"			
Number Cores			2			
Type Curing	Atmospheric -		Pressure	Steam -	Cured	
Minimum Thickness of Shell			1-1/4"			
Minimum Thickness of Tie — End			1"			
Center			1-1/8"			

ABSORPTION						AVG. OF SERIES
Weight of Unit as Received * -lb.	33.35		33.45		33.02	33.27
Weight of Unit Oven Dry * -lb.	31.99		32.33		31.96	32.09
% Moisture Content as Received*	4.25		3.46		3.32	3.68
Weight of Unit Suspended in H_2O-lb.	17.68		17.79		17.58	
Weight of Unit Saturated * -lb.	35.21		35.48		35.09	35.26
% Maximum Absorption *	10.07		9.74		9.79	9.87
Pounds Per Cu. Ft. Absorption *	11.46		11.11		11.15	11.24
Moisture Content % Total Absorption*	42.24		35.56		33.87	37.22
Concrete - Wgt. per Cu. Ft.	113.87		114.04		113.90	113.94

COMPRESSION						
Length Inches						
Width Inches						
Area Square Inches						
Total Load Pounds						
P.S.I. Gross Area *						

REMARKS:

*A.S.T.M. C 140

Form 810 B.R. & T.C.

Rev. 1-65

Tested By: Mike Gentry

Checked By: Don Clay

BESSER RESEARCH & TRAINING CENTER

ALPENA, MICHIGAN

Block Test Data - Laboratory

CUSTOMER: Mineral Sciences Laboratories CANMET — DATE MFG.: 12 Sept. '84

ADDRESS: 405 Rochester Street, Ottawa, Ontario, Canada K1A 0G1 — DATE REC'D: 14 Sept. '84

SAMPLE SUBMITTED BY: L. E. Pfeiffenberger — DATE TESTED: 10 Oct. '84

Batch B-S	BLOCK DESCRIPTION					
TEST MARK	A4-L		A4-C		A4-R	
Type of Material	67% Expanded Slag and 33% Sand					
Type Unit — Nominal Size		8" X 8" X 16"				
Number Cores			2			
Type Curing	Atmospheric -		Pressure Steam -		Cured	
Minimum Thickness of Shell			1-1/4"			
Minimum Thickness of Tie — End			1"			
Center			1-1/8"			

ABSORPTION						AVG. OF SERIES
Weight of Unit as Received * -lb.	32.94		33.03		32.92	32.96
Weight of Unit Oven Dry * -lb.	31.65		31.61		31.47	31.58
% Moisture Content as Received*	4.08		4.49		4.61	4.39
Weight of Unit Suspended in H_2O-lb.	17.24		17.32		17.29	
Weight of Unit Saturated * -lb.	34.83		34.87		34.84	34.85
% Maximum Absorption *	10.05		10.31		10.71	10.36
Pounds Per Cu. Ft. Absorption *	11.28		11.59		11.98	11.62
Moisture Content % Total Absorption*	40.57		43.56		43.03	42.39
Concrete - Wt. per Cu. Ft.	112.28		112.39		111.89	112.19

COMPRESSION						
Length Inches						
Width Inches						
Area Square Inches						
Total Load Pounds						
P.S.I. Gross Area *						

REMARKS:

*A.S.T.M. C 140

Form 810 B.R. & T.C.

Rev. 1-65

Tested By: Mike Gentry

Checked By: Don Clay

BESSER RESEARCH & TRAINING CENTER

ALPENA, MICHIGAN

Block Test Data - Laboratory

CUSTOMER: Mineral Sciences Laboratories CANMET — DATE MFG.: 12 Sept. '84

ADDRESS: 405 Rochester Street, Ottawa, Ontario, Canada K1A 0G1 — DATE REC'D: 14 Sept. '84

SAMPLE SUBMITTED BY: L. E. Pfeiffenberger — DATE TESTED: 10 Oct. '84

Batch C-S	BLOCK DESCRIPTION					
TEST MARK	A12-L		A12-C		A12-R	
Type of Material	75%	Expanded	Slag and	25% Sand		
Type Unit ____ Nominal Size		8"	X 8" X 16"			
Number Cores			2			
Type Curing		Atmospheric -	Pressure	Steam -	Cured	
Minimum Thickness of Shell			1-1/4"			
Minimum Thickness of Tie End			1"			
Center			1-1/8"			
ABSORPTION						AVG. OF SERIES
Weight of Unit as Received * -lb.	33.26		33.20		33.06	33.17
Weight of Unit Oven Dry * -lb.	31.67		31.76		31.56	31.66
% Moisture Content as Received*	5.02		4.53		4.75	4.77
Weight of Unit Suspended in H_2O-lb.	17.46		17.49		17.36	
Weight of Unit Saturated * -lb.	34.92		35.01		34.85	34.93
% Maximum Absorption *	10.26		10.23		10.42	10.30
Pounds Per Cu. Ft. Absorption *	11.62		11.58		11.74	11.65
Moisture Content % Total Absorption*	48.92		44.31		45.59	46.27
Concrete - Wgt. per Cu. Ft.	113.18		113.12		112.60	112.97
COMPRESSION						
Length Inches						
Width Inches						
Area Square Inches						
Total Load Pounds						
P.S.I. Gross Area *						

REMARKS: _____

*A.S.T.M. C 140

Form 810 B.R. & T.C.

Rev. 1-65

Tested By: Mike Gentry

Checked By: Don Clay

BESSER RESEARCH & TRAINING CENTER

ALPENA, MICHIGAN

Block Test Data - Laboratory

CUSTOMER: Mineral Sciences Laboratories CANMET — DATE MFG.: 12 Sept. '84

ADDRESS: 405 Rochester Street, Ottawa, Ontario, Canada K1A 0G1 — DATE REC'D: 14 Sept. '84

SAMPLE SUBMITTED BY: L. E. Pfeiffenberger — DATE TESTED: 10 Oct. '84

Batch A-P	BLOCK DESCRIPTION					
TEST MARK	A16-L		A16-C		A16-R	
Type of Material	50% Pumice and 50% Sand					
Type Unit — Nominal Size	8" X 8" X 16"					
Number Cores	2					
Type Curing	Atmospheric - Pressure Steam - Cured					
Minimum Thickness of Shell	1-1/4"					
Minimum Thickness of Tie — End	1"					
Center	1-1/8"					

ABSORPTION						AVG. OF SERIES
Weight of Unit as Received * -lb.	27.46		27.74		27.77	27.66
Weight of Unit Oven Dry * -lb.	26.36		26.45		26.43	26.41
% Moisture Content as Received*	4.17		4.88		5.07	4.71
Weight of Unit Suspended in H_2O-lb.	12.21		12.29		12.39	
Weight of Unit Saturated * -lb.	29.84		30.01		29.97	29.94
% Maximum Absorption *	13.20		13.46		13.39	13.35
Pounds Per Cu. Ft. Absorption *	12.32		12.54		12.57	12.48
Moisture Content % Total Absorption*	31.61		36.24		37.85	35.23
Concrete - Wet. per Cu. Ft.	93.30		93.14		93.81	93.42

COMPRESSION						
Length Inches						
Width Inches						
Area Square Inches						
Total Load Pounds						
P.S.I. Gross Area *						

REMARKS:

*A.S.T.M. C 140

Form 810 B.R. & T.C.

Rev. 1-65

Tested By: Mike Gentry

Checked By: Don Clay

BESSER RESEARCH & TRAINING CENTER

ALPENA, MICHIGAN

Block Test Data - Laboratory

CUSTOMER: Mineral Sciences Laboratories CANMET — DATE MFG.: 12 Sept. '84

ADDRESS: 405 Rochester Street, Ottawa, Ontario, Canada K1A 0G1 — DATE REC'D: 14 Sept. '84

SAMPLE SUBMITTED BY: L. E. Pfeiffenberger — DATE TESTED: 10 Oct. '84

Batch B-P	BLOCK DESCRIPTION					
TEST MARK	A19-L		A19-C		A19-R	
Type of Material	67% Pumice and 33% Sand					
Type Unit — Nominal Size		8" X 8" X 16"				
Type Unit — Number Cores			2			
Type Curing	Atmospheric -	Pressure	Steam -	Cured		
Minimum Thickness of Shell			1-1/4"			
Minimum Thickness of Tie — End			1"			
Minimum Thickness of Tie — Center			1-1/8"			

	ABSORPTION					AVG. OF SERIES
Weight of Unit as Received * -lb.	25.88		25.81		25.44	25.71
Weight of Unit Oven Dry * -lb.	24.03		24.16		23.92	24.04
% Moisture Content as Received*	7.70		6.83		6.35	6.96
Weight of Unit Suspended in H_2O-lb.	9.54		9.65		9.54	
Weight of Unit Saturated * -lb.	27.19		27.37		27.02	27.19
% Maximum Absorption *	13.15		13.29		12.96	13.13
Pounds Per Cu. Ft. Absorption *	11.17		11.30		11.07	11.18
Moisture Content % Total Absorption	58.54		51.40		49.03	52.99
Concrete - Wgt. per Cu. Ft.	84.96		85.08		85.39	85.14
	COMPRESSION					
Length Inches						
Width Inches						
Area Square Inches						
Total Load Pounds						
P.S.I. Gross Area *						

REMARKS:

*A.S.T.M. C 140

Form 810 B.R. & T.C.

Rev. 1-65

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Checked By: Don Clay

BESSER RESEARCH & TRAINING CENTER

ALPENA, MICHIGAN

Block Test Data - Laboratory

CUSTOMER: Mineral Sciences Laboratories CANMET — DATE MFG.: 12 Sept. '84

ADDRESS: 405 Rochester Street, Ottawa, Ontario, Canada K1A 0G1 — DATE REC'D: 14 Sept. '84

SAMPLE SUBMITTED BY: L. E. Pfeiffenberger — DATE TESTED: 10 Oct. '84

Batch B2-P	BLOCK DESCRIPTION				
TEST MARK	D12-L		D12-C		D12-R
Type of Material	67% Pumice and 33% Sand				
Type Unit — Nominal Size		8" X 8" X 16"			
Number Cores			2		
Type Curing	Atmospheric -		Pressure	Steam -	Cured
Minimum Thickness of Shell			1-1/4"		
Minimum Thickness of Tie — End			1"		
Center			1-1/8"		

ABSORPTION						AVG. OF SERIES
Weight of Unit as Received * -lb.	23.35		24.14		24.45	23.96
Weight of Unit Oven Dry * -lb.	22.15		22.51		22.76	22.47
% Moisture Content as Received*	5.42		7.24		7.43	6.70
Weight of Unit Suspended in H_2O-lb.	10.54		8.79		9.24	
Weight of Unit Saturated * -lb.	25.71		26.10		26.62	26.14
% Maximum Absorption *	16.07		15.95		16.96	16.33
Pounds Per Cu. Ft. Absorption *	14.64		12.94		13.86	13.81
Moisture Content % Total Absorption*	33.71		45.40		43.78	40.96
Concrete - Wgt. per Cu. Ft.	91.11		81.15		81.72	84.66

COMPRESSION						
Length Inches						
Width Inches						
Area Square Inches						
Total Load Pounds						
P.S.I. Gross Area *						

REMARKS:

*A.S.T.M. C 140

Form 810 B.R. & T.C.

Rev. 1-65

Tested By: Mike Gentry

Checked By: Don Clay

BESSER RESEARCH & TRAINING CENTER

ALPENA, MICHIGAN

Block Test Data - Laboratory

CUSTOMER: Mineral Sciences Laboratories CANMET — DATE MFG.: 12 Sept. '84

ADDRESS: 405 Rochester Street, Ottawa, Ontario, Canada K1A 0G1 — DATE REC'D: 14 Sept. '84

SAMPLE SUBMITTED BY: L. E. Pfeiffenberger — DATE TESTED: 10 Oct. '84

Batch C-P	BLOCK DESCRIPTION					
TEST MARK	A21-L		A21-C		A21-R	
Type of Material	75% Pumice and 25% Sand					
Type Unit — Nominal Size		8" X 8" X 16"				
Number Cores			2			
Type Curing	Atmospheric - Pressure Steam - Cured					
Minimum Thickness of Shell			1-1/4"			
Minimum Thickness of Tie — End			1"			
Center			1-1/8"			

	ABSORPTION					AVG. OF SERIES
Weight of Unit as Received * -lb.	23.17		23.17		22.82	23.05
Weight of Unit Oven Dry * -lb.	21.53		21.76		21.50	21.60
% Moisture Content as Received*	7.62		6.48		6.14	6.75
Weight of Unit Suspended in H_2O-lb.	8.30		8.43		8.36	
Weight of Unit Saturated * -lb.	25.46		25.81		25.58	25.62
% Maximum Absorption *	18.25		18.61		18.98	18.62
Pounds Per Cu. Ft. Absorption *	14.29		14.54		14.78	14.54
Moisture Content % Total Absorption	41.73		34.81		32.35	36.30
Concrete - Wgt. per Cu. Ft.	78.29		78.13		77.91	78.11

	COMPRESSION					
Length Inches						
Width Inches						
Area Square Inches						
Total Load Pounds						
P.S.I. Gross Area *						

REMARKS:

*A.S.T.M. C 140

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ALPENA, MICHIGAN

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ADDRESS: 405 Rochester Street, Ottawa, Ontario, Canada K1A 0G1 — DATE REC'D: 14 Sept. '84

SAMPLE SUBMITTED BY: L. E. Pfeiffenberger — DATE TESTED: 10 Oct. '84

Batch A-SCW	BLOCK DESCRIPTION				
TEST MARK	A29-L		A29-C		A29-R
Type of Material	50%	Sintered	Coal Waste	and 50%	Sand
Type Unit — Nominal Size		8"	X 8" X 16"		
Number Cores			2		
Type Curing	Atmospheric -		Pressure	Steam -	Cured
Minimum Thickness of Shell			1-1/4"		
Minimum Thickness of Tie — End			1"		
Center			1-1/8"		

ABSORPTION						AVG. OF SERIES
Weight of Unit as Received * -lb.	26.57		26.23		26.84	26.55
Weight of Unit Oven Dry * -lb.	25.23		25.28		25.53	25.35
% Moisture Content as Received*	5.31		3.76		5.13	4.73
Weight of Unit Suspended in H_2O-lb.	11.79		11.57		12.04	
Weight of Unit Saturated * -lb.	29.16		29.07		29.56	29.26
% Maximum Absorption *	15.58		14.99		15.79	15.45
Pounds Per Cu. Ft. Absorption *	14.12		13.51		14.35	13.99
Moisture Content % Total Absorption*	34.10		25.07		32.51	30.56
Concrete - Wgt. per Cu. Ft.	90.64		90.14		90.93	90.57

COMPRESSION						
Length Inches						
Width Inches						
Area Square Inches						
Total Load Pounds						
P.S.I. Gross Area *						

REMARKS: _____

*A.S.T.M. C 140

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Tested By: Mike Gentry

Checked By: Don Clay

BESSER RESEARCH & TRAINING CENTER

ALPENA, MICHIGAN

Block Test Data - Laboratory

CUSTOMER: Mineral Sciences Laboratories CANMET

ADDRESS: 405 Rochester Street, Ottawa, Ontario, Canada K1A 0G1

SAMPLE SUBMITTED BY: L. E. Pfeiffenberger

DATE MFG.: 12 Sept. '84

DATE REC'D: 14 Sept. '84

DATE TESTED: 10 Oct. '84

Batch B-SCW	BLOCK DESCRIPTION					
TEST MARK	D3-L		D3-C		D3-R	
Type of Material	67%	Sintered	Coal Waste	and 33%	Sand	
Type Unit — Nominal Size		8"	X 8" X 16"			
Number Cores			2			
Type Curing	Atmospheric -		Pressure	Steam -	Cured	
Minimum Thickness of Shell			1-1/4"			
Minimum Thickness of Tie — End			1"			
Center			1-1/8"			

ABSORPTION						AVG. OF SERIES
Weight of Unit as Received * -lb.	24.86		24.95		24.79	24.87
Weight of Unit Oven Dry * -lb.	23.52		23.84		23.43	23.60
% Moisture Content as Received*	5.70		4.66		5.80	5.39
Weight of Unit Suspended in H_2O-lb.	9.75		9.88		9.65	
Weight of Unit Saturated * -lb.	27.19		27.50		27.19	27.29
% Maximum Absorption *	15.60		15.35		16.05	15.67
Pounds Per Cu. Ft. Absorption *	13.13		12.96		13.38	13.16
Moisture Content % Total Absorption*	36.51		30.33		36.17	34.34
Concrete - Wet. per Cu. Ft.	84.15		84.43		83.35	83.98

COMPRESSION						
Length Inches						
Width Inches						
Area Square Inches						
Total Load Pounds						
P.S.I. Gross Area *						

REMARKS:

*A.S.T.M. C 140

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ADDRESS: 405 Rochester Street, Ottawa, Ontario, Canada K1A 0G1 — DATE REC'D: 14 Sept. '84

SAMPLE SUBMITTED BY: L. E. Pfeiffenberger — DATE TESTED: 10 Oct. '84

Batch C-SCW	BLOCK DESCRIPTION					
TEST MARK	D6-L		D6-C		D6-R	
Type of Material	75%	Sintered	Coal Waste and 25%		Sand	
Type Unit — Nominal Size		8"	X 8" X 16"			
Number Cores			2			
Type Curing	Atmospheric -		Pressure	Steam -	Cured	
Minimum Thickness of Shell			1-1/4"			
Minimum Thickness of Tie — End			1"			
Center			1-1/8"			

ABSORPTION						AVG. OF SERIES
Weight of Unit as Received * -lb.	24.09		24.02		23.84	23.98
Weight of Unit Oven Dry * -lb.	22.76		22.69		22.71	22.72
% Moisture Content as Received*	5.84		5.86		4.98	5.56
Weight of Unit Suspended in H_2O-lb.	8.72		8.68		8.73	
Weight of Unit Saturated * -lb.	26.30		26.29		26.32	26.30
% Maximum Absorption *	15.55		15.87		15.90	15.77
Pounds Per Cu. Ft. Absorption *	12.57		12.76		12.81	12.71
Moisture Content % Total Absorption*	37.57		36.94		31.30	35.27
Concrete - Wet. per Cu. Ft.	80.79		80.40		80.56	80.58

COMPRESSION						
Length Inches						
Width Inches						
Area Square Inches						
Total Load Pounds						
P.S.I. Gross Area *						

REMARKS:

*A.S.T.M. C 140

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